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The Official Organ of The American Oil Chemists' Society

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Journal of Oil and Fat Industries

Devoted to Oils, Fats and Allied Industries

VOL. III **JUNE, 1926** **No. 6**

EDITORIAL

THE MEMBER

At the beginning of the new year in the history of the American Oil Chemists Society, it is well to pause and consider the lessons the past year has taught us so that we can better plan our course for the coming year. No better summary of last year's business of the Society is possible than that contained in the address of our former president, J. J. Vollertsen, at our annual convention in New Orleans last month, and which was published in the May number of this JOURNAL. Its re-perusal is commended to every member of the Society.

The work of the Society can only progress in so far as the individual members take part in its activities. Participation in the work of some committee will aid not only the Society, but the individual. If any member of the society is interested in any particular subject and would like to work on the committee investigating it, he owes it to the Society to communicate with its President and give him the opportunity to utilize those services. If anyone thinks the Society should be investigating a problem for which there is no committee, don't keep the idea to yourself. Suggestions for the betterment of the Society are always in order.

THE JOURNAL OF OIL FAT INDUSTRIES, since it now is being issued monthly, offers us an opportunity to have the results of our individual investigations published quickly. I urge the members to send in their papers. The success of the Society and its JOURNAL depends more upon the efforts of its members than the efforts of its officers. A man may never attend an annual meeting, but by the work he does on committees he may mould the activities of the Society so that his influence is in reality greater than that of any officer.

R. H. FASH

REPORT OF THE DETERGENTS COMMITTEE

The efforts of the Detergents Committee were confined largely to perfecting the personnel of the Committee and outlining and aiding in the promotion of the Sub-Committee on the Detergency of Soap.

Some work was taken up on the Standard Methods of Analysis of Soap but no changes were made in these Methods.

The personnel of the Committee is as follows:

Edward Bauer, Kirk & Co.
H. C. Bennett, Los Angeles Soap Co.
J. S. Boulden, Wm. Waltke & Co.
Dr. J. C. Brier, Prof. Chem. Eng., University of Michigan.
R. K. Brodie, Procter & Gamble Co.
Dr. V. K. Cassady, Palmolive Co.
A. K. Church, Lever Bros.
R. E. Divine, 284 Beach St., Hackensack, N. J.
Dr. J. S. Goldbaum, Fels & Co.
F. H. Guernsey, Cowles Detergent Co.
Dr. M. H. Ittner, Colgate & Co.
G. H. Johnson, Director of Research, Laundryowners National Assn., Mellon Institute, Pittsburgh, Pa.
Frederick Kenny, City of New York Board of Purchase, Central Testing Laboratory, New York, N. Y.
C. P. Long, The Globe Soap Co.
E. T. Marceau, Gold Dust Corporation.
Prof. E. B. Millard, Mass. Institute of Technology, Cambridge, Mass.
H. S. Mitchell, Swift & Co.
J. R. Powell, Armour Soap Works.
W. S. Rapelje, Kirkman's & Son.
W. T. Reese, Peet Bros.
J. G. Vail, Philadelphia Quartz Co., Philadelphia, Pa.
F. W. Smither, Bureau of Standards, Washington, D. C.
Dr. P. H. Walker, Bureau of Standards, Washington, D. C.
L. F. Hoyt, Chairman, Sub Committee, Larkin Co., Inc.
Archibald Campbell, Chairman, The Globe Soap Co.

Practically the entire Detergents Committee confined their efforts during the year to the work outlined by the Sub-Committee under the direction of L. F. Hoyt.

ARCHIBALD CAMPBELL, Chairman.

REPORT OF COMMITTEE ON AMMONIA AND SMALLEY FOUNDATION

Check Meal Samples for 1925-1926

In tables Nos. I to IV following is set forth a summary of the results of the co-operative analytical work for both oil and ammonia for the past year. During this year 81 collaborators have participated, as compared with 75 last year and 78 the year before.

Table I gives the standing of the 35 collaborators who reported oil determinations on all of the samples. Only 29 collaborators reported oil on all of the samples last year, and 36 the year before.

TABLE I.

STANDING FOR OIL RESULTS.

Rank	Analyst No.	Points Off	Av. Error Per Sample	Efficiency Per Cent
1	37	23	.0077	99.871
2	80	38	.0128	99.786
3	74	41	.0137	99.771
4	20	45	.0150	99.749
5	33	51	.0170	99.715
6	68	56	.0187	99.687
7	21	58	.0193	99.677
	19	58	.0193	99.677
9	4	64	.0213	99.643
10	23	65	.0217	99.637
11	26	68	.0227	99.620
12	78	69	.0230	99.615
13	22	74	.0247	99.586
14	8	77	.0257	99.570
15	49	83	.0277	99.536
16	69	105	.0350	99.414
17	39	106	.0353	99.409
18	43	123	.0410	99.313
19	60	129	.0430	99.280
20	45	131	.0437	99.268
21	3	139	.0463	99.224
22	40	152	.0507	99.151
23	73	155	.0517	99.134
24	67	158	.0527	99.117
25	42	173	.0577	99.034
26	25	176	.0587	99.017
27	9	186	.0620	98.961
28	65	204	.0680	98.861
29	5	245	.0817	98.631
30	55	279	.0930	98.443
31	61	308	.1027	98.280
32	47	317	.1057	98.229
33	2	321	.1070	98.208
34	46	362	.1207	97.978
35	56	728	.2427	95.935

Table II gives the corresponding standing of 52 collaborators who re-

ported ammonia on all of the samples. Only 42 reported ammonia on all of the samples last year and 50 the year before.

TABLE II.

STANDING FOR AMMONIA RESULTS

Rank	Analyst No.	Points Off	Av. Error Per Sample	Efficiency Per Cent
1	40	7	.0023	99.966
	48	7	.0023	99.966
3	74	9	.0030	99.956
4	80	10	.0033	99.951
5	23	12	.0040	99.941
6	25	13	.0043	99.937
7	31	14	.0047	99.931
	37	14	.0047	99.931
9	10	19	.0063	99.907
10	12	20	.0067	99.901
11	8	22	.0073	99.892
	43	22	.0073	99.892
13	17	23	.0076	99.888
	20	23	.0076	99.888
15	4	25	.0083	99.878
	49	25	.0083	99.878
	60	25	.0083	99.878
	68	25	.0083	99.878
19	78	27	.0090	99.867
20	19	32	.0107	99.843
21	21	33	.0110	99.838
22	39	36	.0120	99.823
23	45	37	.0123	99.819
24	67	41	.0137	99.798
25	69	43	.0143	99.789
26	65	47	.0157	99.769
27	33	48	.0160	99.764
28	22	49	.0163	99.760
29	26	50	.0167	99.754
	59	50	.0167	99.754
31	44	55	.0183	99.729
32	47	56	.0187	99.725
33	2	57	.0190	99.720
	32	57	.0190	99.720
35	27	66	.0220	99.676
36	42	67	.0223	99.672
37	73	70	.0233	99.657
38	5	84	.0280	99.588
39	54	86	.0287	99.577
	55	86	.0287	99.577
41	11	92	.0307	99.548
42	3	105	.0350	99.485
43	14	109	.0363	99.465
44	77	118	.0393	99.421
45	28	125	.0417	99.386
46	46	127	.0423	99.377
47	61	135	.0450	99.337
48	13	138	.0460	99.323
49	50	162	.0540	99.189
50	29	181	.0603	99.112
51	34	262	.0873	98.714
52	56	369	.1230	98.189

Table III gives the combined average laboratory standing for both oil and ammonia for the 34 collaborators who reported oil and ammonia on all

of the samples. Last year 28 reported oil and ammonia determinations on all samples and 36 the year before.

TABLE III.

LABORATORY STANDING FOR BOTH OIL AND AMMONIA RESULTS

Rank	Analyst No.	Efficiency Per Cent	Rank	Analyst No.	Efficiency Per Cent
1	37	99.901	18	69	99.601
2	80	99.869	19	60	99.584
3	74	99.864	20	40	99.584
4	20	99.819	21	45	99.543
5	23	99.789	22	25	99.477
6	68	99.782	23	67	99.457
7	4	99.761	24	73	99.395
8	19	99.760	25	3	99.354
9	21	99.757	26	42	99.353
10	78	99.741	27	65	99.315
11	33	99.739	28	5	99.109
12	8	99.731	29	55	99.010
13	49	99.707	30	47	98.977
14	26	99.687	31	46	98.677
15	22	99.673	32	2	98.464
16	39	99.616	33	61	98.308
17	43	99.603	34	56	97.062

Table IV gives a summary of the results of other collaborators who have failed to report on all samples but whose results deserve recognition.

TABLE IV.

RESULTS OF OTHER COLLABORATORS WHO FAILED TO REPORT ON ALL SAMPLES BUT WHOSE RESULTS DESERVE RECOGNITION.

Analyst	No. of Samples Reported	Points off Oil	Amm.
1	26	71	16
6	27	119	276 (29 s.)
9	29	*	58
15	29		121
16	29		53
18	28		58
30	29		118
35	27	270	53
38	28		49
62	21	215	31
66	28		26
70	23	161	85
71	28	108	149
72	29	108	74
75	27		57
79	29	124	114
82	24		37

*30 samples; reported in Table I.

Several have reported on all but one or two samples. There have been a few cases where a sample was not received in time to make a report, and in some cases reports were lost in the mails, and the collaborator had not requested to be notified by wire of such delay. All reports, however, received even after the scheduled time, have been accepted up to the time the chairman's report went to the printer on Wednesday morning.

The prize awards for the best work done on these samples are the same as published in 1923. The winners of these awards for this year are:

The laboratory cup for the highest average for both oil and ammonia goes to No. 37, Battle Laboratory, Montgomery, Alabama, whose average per cent efficiency is 99.901. The certificate for second place to No. 80, E. H. Tenent, International Sugar Feed Co., Memphis, Tenn., whose average per cent efficiency is 99.869. The corresponding percentages for last year were 99.895 and 99.892 respectively.

The certificates for the highest average for oil results are awarded to No. 37, Battle Laboratory, Montgomery, Alabama, whose percentage is 99.871, and (second) to No. 80, E. H. Tenent, Memphis, Tenn., whose average is 99.786. The corresponding percentages for last year were 99.880 and 99.848.

The certificates for the highest average for ammonia results goes to No. 40, Landon C. Moore, Inc., Dallas, Texas, and No. 49, F. B. Carpenter, Virginia-Carolina Chemical Co., Richmond, Virginia, whose averages are alike—99.966 per cent. The corresponding percentages for last year were 99.956 and 99.942, respectively.

In accordance with the resolution adopted by the American Oil Chemists Society, the identity of the other collaborators will not be disclosed.

The method for determining the standing of the various collaborators and their per cent efficiency is the same as used heretofore, and fully described in the *Cotton Oil Press* of January, 1923, VI, No. 9, Page 33. The chairman does not guarantee the accuracy of all the percentages given in tables I to IV. Only about half the collaborators have responded to his request to send in a check-up of their own standing. It would seem that each collaborator would be willing to co-operate to this extent. However, the average per cent efficiency for the first ten in tables I and II has been double checked to insure accuracy, in cases where the collaborator had failed to send in his record.

The chairman has received several requests from collaborators to change their results, after they had appeared on the printed report, due either to error in calculation of results, to typographical error in report, or to loss in the mails, but the chairman has taken the position that such changes are not permissible. An opportunity is afforded all to be advised by wire collect in case their reports are not received in time or in case there seems to be a typographical error in their reports. Only 29 of the collaborators availed themselves of this offer. The chairman has endeavored to be entirely fair in these cases and sincerely hopes that he has been, and at times has stretched a point where this seemed reasonable.

A notation on the report of Meal Sample 29 requested a reply to the following questions:

1. Do you consider the samples which have been sent out this past year to be as uniform as could be reasonably expected and generally satisfactory in character?
2. Would you consider it desirable to continue check samples during the summer, possibly once a month?
3. Would you consider a rough average of moisture results, indicated on each weekly report, of any particular value?

The following is a summary of the 22 replies received:

1. *This year's samples.*
   - Not very uniform 1
   - Mostly uniform 2
   - Uniform 15

   One collaborator perfers higher percentage meals, and one suggests that new meal be used.
2. *Summer samples.*
   - Not desirable 10
   - Desirable 7
   - Occasionally 4
   - Doubtful 1
3. *Value of Moisture average.*
   - No value 9
   - Advisable 9
   - Interesting but no value..... 4
   - Advisable if standard moisture method used.... 1

From the above it is quite apparent that in general the samples this year have been considered as uniform as could be reasonably expected. This has been further attested by the few complaints which have been made on the samples received. A vote of thanks is due R. F. Monsalvatge for his care in preparing and handling these samples. He wishes to be advised of any complaints on the samples, in order that the may investigate the matter. With some contemplated changes in the method of preparation, etc., he believes the samples another year will be more uniform than this year. The chairman recommends that this important work be entrusted to Mr. Monsalvatge again next year.

With reference to summer samples, it would seem from the replies received that there is not much interest in such samples. This is a matter which the Society should consider at this meeting.

As to Moisture average, it appears from the replies received that the majority do not think this would be of any value. The chairman is inclined to agree with this opinion but would like to have the Society's views:

H. C. Moore, *Chairman*
C. A. Butt
L. B. Forbes
H. B. Battle
W. J. Gascoyne, Jr.

REPORT OF THE COMMITTEE ON THE ANALYSIS OF COMMERCIAL FATS AND OILS

It has been a principle of this committee from the beginning to develop and adopt methods covering determinations which are not well established, by its own labors; but wherever other committees or societies have already developed and adopted methods in their own special fields, these have been adopted in toto unless there are important and valid reasons why they should not be adopted.

This committee functioning as a committee of the American Chemical Society had hoped to be able to adopt the Methods for Refining Vegetable Oils and for Making Color Readings by Means of the Lovibond Color Glasses as established by the A. O. C. S. But when these were carefully studied by this committee, it was decided that they were not in proper form for adoption. This applies particularly to the Method for Refining and the Method for Making Color Reading.

Specifically, some of the objections to these methods as they stand are as follows:

In the first place, they are not written up as chemical and physical testing methods should be, apart from the commercial transaction involved. It has been a fundamental principle of this committee that all methods adopted should be definite, physical and chemical methods, and that commercial transactions based on them should be regarded as a separate matter. This principle cannot be departed from in any part of the methods published by this committee.

In the second place, the Methods of the A. O. C. S. for Refining Loss and Color are indefinite, vague and incomplete under

(1) PRIME COTTONSEED OIL, (a) General Directions, which read:

> "The quantity of dry sodium hydroxide to be used in refining Prime Oil must not exceed 1.097 per cent by weight of the Oil for hydraulic pressed oils, and must be employed in solution of 10, 12, 14, 16, 18, and 20 degrees Baume at 20 degrees C.
>
> "Note—In case the above limit of sodium hydroxide produced worse than a prime color with a loss less than 9 per cent, then a greater amount of sodium hydroxide can be used in order to produce a prime color if possible, provided the refining loss does not exceed 9 per cent, and in such case if a prime color is produced, the oil shall be graded a prime as to color."

It will be obvious to any disinterested chemist that the note offsets and does away with practically all that precedes it. This method should

be written up as a single paragraph and put in definite form.

The next paragraph reads:

> "No oil shall be rejected unless treated with three or more sodium hydroxide solutions of the above Baume; nor shall any claim for excessive refining loss be established if it can be proven that the color can be made with a smaller loss than produced with the maximum amount of sodium hydroxide allowed; nor shall any claim for deficiency in color be established if it can be proven that the color can be obtained without exceeding 9 per cent refining loss with maximum amount of caustic soda allowed."

The commercial matter in this paragraph should be entirely eliminated from the method. If, in the opinion of the committee, it seems desirable that "three or more sodium hydroxide solutions" be used, this should appear in the method as a part of the method.

> Under COLOR, the directions are as follows:
> "(a) Report color of refined oil in terms of Lovibond's equivalent color scale using yellow and red glasses.
> "In every case where color standards are mentioned, only the two standard glasses specified in the rule must be used to determine the grade.
>
> "(b) The color examination shall be made as follows: Place the oil in a white polished-bottomed bottle or cylinder of such depth that a column of oil 5¼ inches can be accurately measured therein. Such bottle or cylinder to be of not less than ¾ inch internal diameter. The reading shall be made by artificial light in a form of tintometer approved by the Chemist Committee of the Interstate Cottonseed Crushers Association and at a temperature of about 21 degrees C. If the oil is of deeper color than the combined standard glasses 35 Yellow 7.6 Red, it shall not be classed as prime."

These directions are entirely inadequate. No description is given of the form of tintometer to be used, although the one in general use is of a standardized type. This method does not specify the manner of applying the Lovibond glasses, the assumption probably being that everybody knows how to do this. Details should be introduced into the method. No provision is made for reading oils of color darker than 35 Yellow and 7.6 Red, or for reading oils of less than this amount of color. No method is given for reading bleached oils.

Under (2) OFF OIL (a) General Directions, no mention whatever is made of color, although it is well known by all oil chemists that the

reading of color in the case of off oils is a matter of great difficulty and at the present time of no agreement, although such readings are frequently made. The method should be standardized as well as possible under present conditions and with existing knowledge, in the view of your committee.

On the page following is a Suggested Method for Color Reading of Normal, Bleached and Off-Color Cottonseed Oil and Other Vegetable Oils.

The suggestion of your Committee on the Analysis of Commercial Fats and Oils is that the proper committee of the A. O. C. S. redraft the Method for Refining, Bleaching and Color Reading of Vegetable Oils and that these be revised and written in the light of the above suggestion.

W. D. RICHARDSON, Chairman.

SUGGESTED METHOD FOR COLOR READING OF NORMAL, BLEACHED AND OFF-COLOR COTTONSEED OIL AND OTHER VEGETABLE OILS

GENERAL. For reading and comparing the colors of vegetable oils, use is made of the well known Lovibond yellow and red color glasses. Although this method of color reading is far from perfect and the standard glasses not all that might be desired, nevertheless this method appears to be the most practical of any suggested up to the present time and also has the sanction of general and long-continued use.

APPARATUS. For making the color reading, the standard tintometer shown in the sketch attached hereto is used, all oils being read at a temperature of 21.0°C. This apparatus consists of several parts—a light tight box, a standard blue glass incandescent bulb of 150 watts, which should be changed frequently enough to maintain a fairly constant illumination, a block of magnesia directly under the optical element which receives the light from the bulb and affords a white background against which to read the color, means for supporting the column of oil to be read and the color glasses, optical part consisting of prisms and lenses which produce a split field and thus make the color comparison easier.

READING THE COLOR. There are three general types of cottonseed oil on which color readings are regularly made (1) Bleached oils of very light color, (2) Prime oils which as defined by the rules of the Interstate Cottonseed Crushers Association have a color not greater than that produced by the combined Lovibond glasses 35 Yellow and 7.6 Red, and (3) Off-color oils which may have a color as high as 150 Yellow and 25 Red, or even much more than this. The oil whose color is to be read is placed in an oil bottle or in a suitable tube not less than ¾″ in diameter, and is read in a column of 5¼″ depth. A corresponding bottle or tube of clear, colorless alcohol or water is placed in a duplicate bottle or tube in the holder in parallel with the oil column. The yelow and red glasses are then placed in the space above the clear bottle or tube provided for this purpose, and suitable color glasses are added or substituted until the best possible color match for the oil is obtained, with due regard both for the quality of color and the depth of shade or intensity of color.

In the case of Bleached Oils, the Lovibond glasses afford excellent results, and in the case of Prime Oils also the results are reasonably good. But Off-color Oils afford considerable difficulty. This is because of the fact that to match a precise quality of color, a blue or grey shade is needed in addition to the yellow and red. However, the best match possible is reported making use of the standard yellow and red glasses. Soya Bean

Oil offers great difficulty in obtaining a correct match, as do also some samples of cocoanut oil.

REPORTING RESULTS. All results are to be reported in terms of the yellow and red Lovibond glasses, thus: For a Bleached Cottonseed Oil, 10 Yellow, 1.5 Red; for a Prime Cottonseed Oil, 35 Yellow, 7.1 Red; for an Off-color Oil, 135 Yellow, 15 Red.

W. D. RICHARDSON, Chairman,
Committee on Analysis of Commercial Fats and Oils.

OIL AND AMMONIA CONTENT OF DIFFERENT VARIETIES OF COTTONSEED GROWN IN VARIOUS LOCALITIES

A Progress Report

By A. F. SIEVERS and M. S. LOWMAN

For the past three years the Bureau of Plant Industry has been engaged in a study of the relationship of varietal and cultural factors to the oil and ammonia content of cottonseed. This work constitutes one of the research problems proposed by the Basic Research Committee of the American Oil Chemists Society and the Interstate Cottonseed Crushers' Association. At the annual meeting of the former organization at New Orleans in 1924 the senior writer presented a summary of the results of the first year's work which indicated that some fundamental facts of interest to both growers and crushers of cottonseed might be established by this investigation. At the meeting of this Society last year a progress report was submitted stating that the second year's work appeared to substantiate largely the results obtained the first year, although the complete analytical data were not available at that time. Data on the oil content of the seed from a large number of varieties grown in a number of widely separated localities over a period of three years have now been obtained. These data cannot be readily presented in a paper without the use of extensive tabulations, but a brief summary may be given which will show the progress being made and which will give further indication of the trend of results which are being obtained.

Among a total of approximately thirty varieties of cotton there are three or four which have for three years consistently shown a higher oil content than the others and a similar number have with equal consistency shown an oil content noticeably below the average. Such a tendency on the part of both groups has manifested itself in the several localities in which the seed was grown. This points to the probability that certain inherent characteristics regarding oil content are sufficiently distinct in certain varieties under varying cultural conditions to warrant careful consideration by the grower in connection with the selection of suitable varieties for his particular locality.

The ammonia determinations have again been made by the Barrow-Agee Laboratories, but the necessary calculations for last year's samples have not yet been completed and therefore no comments can be made regarding the results for the entire three years. The ammonia figures covering the first two years do not point toward such a definite trend as is the case with the oil content. However, it seems likely that some interesting facts will be established from this phase of the work after it has been extended over a longer period

During the coming season it is planned to secure seed of the several varieties from one or probably two additional regions, both in the southeastern area. In other respects the work will be continued along the same lines as heretofore.

BUREAU OF PLANT INDUSTRY,
U. S. Department of Agriculture.

REPORT OF THE MOISTURE COMMITTEE

The Moisture Committee continued the work of last year and has confined its efforts to a further test of the Bidwell-Sterling Moisture Method.

Fifty-seven collaborators signified their intention to work with this committee. Six samples of cottonseed meal were sent out during six months by the Smalley Foundation to these collaborators. These samples were to be tested for moisture by the Bidwell-Sterling method. The results have been tabulated and are given herewith:

Results on First Sample

B—S	B—S	B—S	B—S	Oven
7.70	9.27	7.80	6.53	7.00
7.44	8.18	7.20	7.46	6.50
7.58	7.15	7.84	7.59	6.16
7.50	7.26	7.87	8.30	6.40
6.40	7.87	6.45	7.30	7.47
7.40	7.74	6.00	7.50	7.06
5.90	7.30	7.83	7.50	6.57
7.80	6.10	6.52	7.20	

Results on Second Sample

B—S	Oven	B—S	Oven	B—S
8.39	8.35	8.80	7.42	7.44
8.08	8.21	9.83	7.60	8.80
8.26	8.00	8.33	8.36	9.08
8.16	8.03	8.60	8.66	8.52
8.74	8.36	8.26	8.15	8.40
8.60	8.54	8.06	8.30	7.18
7.39	7.48	8.43	7.90	9.05
8.11	7.60	8.62	8.17	
8.40	8.28	8.57	8.21	
8.47	7.67			

Results on Third Sample

B—S	Oven	B—S	Oven	B—S	Oven
7.60	7.60	9.28	7.80	7.75	7.36
7.45	7.72	7.44	7.51	7.72	7.45
7.92	7.56	7.68	7.26	8.40	7.52
10.26	6.96	6.53	7.13	7.33	7.37
7.60	7.20	7.62	6.75	7.60	7.72
8.20	7.86	7.50	7.50	8.20	7.70
7.71	7.55	7.28	7.82	7.66	7.20
8.20	6.72	7.06	7.02	7.00	6.70
7.84	7.22				

Results on Fourth Sample

B—S	Oven	B—S	Oven	B—S	Oven	B—S	Oven
7.73	7.40	8.40	8.00	8.21	8.30	8.36	7.80
7.60	7.94	8.21	7.71	9.40	8.10	7.92	7.89
8.56	7.78	8.00	7.80	7.00	7.68	9.80	7.63
7.95	8.09	8.53	8.32	8.10	7.96	7.80	7.37
8.92	7.04						

Results on Fifth Sample

B—S	Oven	B—S	Oven	B—S	Oven
8.44	7.92	8.40	8.00	7.80	7.79
8.56	8.06	8.26	8.02	8.28	7.98
8.04	7.56	8.53	8.36	8.25	7.85
8.35	7.71	8.39	7.90	7.35	8.20
7.15	7.24	7.60	7.38		

Results on Sixth Sample

B—S	Oven	B—S	Oven	B—S	Oven
9.50	8.97	9.20	9.30	9.92	9.36
8.80	8.89	9.30	9.40	8.70	8.82
9.33	8.97	9.40	9.35	9.65	8.96
9.00	8.90	9.70	9.73	9.00	8.76
9.36	8.86				

Seventy per cent of the collaborators reported on the first sample, fifty per cent reported on the second sample, forty-four per cent on the third sample, thirty per cent on the fourth, twenty-five per cent on the fifth and twenty-two per cent on the sixth. You will note that the results are far from being satisfactory. You will also note that many of the collaborators gave up the work in its early stages, rendering it impossible for your committee to draw the conclusion that would have been possible had the collaborators "stuck to the ship." We are all aware of the importance of the moisture determinations and the large discrepancies which often occur when different laboratories report moisture on the same sample.

Your committee knows of no other analytical process in which we are concerned that needs greater special attention than moisture determination, as shown by our moisture results on check meal work and on our past year's work using the Bidwell-Sterling method, and these results also show conclusively that many of our laboratories are not equipped with a uniform and constant temperature oven.

In sending out instructions for the use of the Bidwell-Sterling apparatus, your chairman said that no special training in technique is required for manipulating this apparatus as several analysts, unacquainted with the method, after simple explanation were able to obtain entirely satisfactory results at the start. It would seem, however, that many of the collaborators took too seriously the wording of the original instructions sent out by this committee; for it was not our intention to restrict the time of the method to one hour, but to distill until all the moisture is over. The rate of distillation is relative and does not need to be adhered to exactly. The idea is to keep the condensed water from getting too high in the condenser as to make its removal difficult.

The disagreement between the distillation and oven methods is to be expected as it has been thoroughly proven that the drying oven results at atmospheric pressure run consistently lower than those obtained by the distillation method. It is probable that the difficulty was not in getting all of the moisture out of the sample, but rather in not getting all of the moisture from the condenser into the receiving tube.

Dr. G. L. Bidwell, Bureau of Chemistry, Washington, D. C., gives in detail exactly how he manipulates the determination in his laboratory:

"It might possibly help to detail how we manipulate the determination in this laboratory. Clean the receiving tube and condenser with fresh

sulphuric-chromic acid mixture, rinse with water and alcohol and dry in an oven. Add sufficient dry sand to cover the bottom of the flask and 50-75 cc. of toluene. Weigh out sample and transfer to flask as rapidly as possible. Connect and distill slowly for about one-half hour keeping the uncondensed column of toluene and water vapors from getting more than an inch up into the condenser. Wash down by pouring about 5-10 cc. of toluene through the condenser. Repeat this process every five minutes until no more droplets of moisture come over. If it is necessary use the brush near the end of the process. If drops adhere to the side of the tube push them down with a rubber band wrapped around a piece of wire.

"We prefer a condenser with the condensing tube of not over ⅜ in. diameter, as we have found those of larger diameter less satisfactory. We also bevel the tip of the condenser, and draw the tip down to a fine point."

Some of the collaborators found increased moisture yield upon extending the time of distillation to one and one-half hours and even to two hours.

Very diversified opinions exist among our collaborators as to the merits and demerits of the Bidwell-Sterling Moisture Method. Among those who express themselves we quote the following:

"We believe that the method is about the most scientific devised so far, and are willing to continue the experimental work if the other collaborators are willing to do the same."

"Although our results have not been particularly good, we think that it is only a question of becoming adjusted to the method before results obtained will be close enough to justify using this as an official method."

"We are arranging to follow the work closely on sample six, but up to the present time we have not found the method satisfactory."

"It is a good method and has wide application. We are using it here every day for moisture of various kinds as it can be used on material where oven drying is absolutely inapplicable."

"I feel sure that part of the non-uniformity in the results is due to the fact that some laboratories use a small sample and follow the method exactly, while others use larger samples and vary the method to suit conditions."

"We are inclined to believe that some of the rather low results can be explained by the implicit faith of some of the collaborators in the oven method and the consequent attempt to obtain agreement between the two methods."

"I am of the opinion that results obtained so far do not warrant a recommendation of the method as it stands. I do not believe, however, that a distillation method which will give satisfactory results can be worked out and believe it very desirable to have such a method."

It was the hope of this committee at the outset that it would be in position to report something definite at this time with reference to the employment, for official purposes, of the Bidwell-Sterling Moisture Method. We do, however, recommend that this method be further studied.

The chairman wishes to thank the members of the committee as well as the other members of the American Oil Chemists' Society for their hearty cooperation during the year. I wish especially to thank Drs. G. L. Bidwell and W. F. Sterling, of the C. F. & G. I. Laboratory, Washington, D. C., for their sincere cooperation.

P. S. TILSON, Chairman.
S. L. INGERSOL.
W. H. IRWIN.
J. P. LONG.
R. C. HATTER.

REPORT OF THE RESOLUTIONS COMMITTEE

Whereas, It has pleased God in His infinite wisdom to take from our midst one of our most beloved a l valued members, and

Whereas, In the sudden death of David Schwartz in Houston, Texas, February 3, 1926, it is fitting that we his friends and associates who have known him for so many years should express our very great sorrow and a deep appreciation of our own loss.

David Schwartz was a man of the very highest type of gentleman and scholar. Born in Boston, Mass., March, 1876, he was educated in the schools of that city and entered the Massachusetts Institute of Technology, from which institution he was graduated in 1897. In the same year he entered the employ of the Southern Cotton Oil Company and remained in their employ for a term of twenty-seven years, or until 1924. During this time he rapidly advanced in position, finally becoming General Manager of Refineries. At the time of his death he was Vice-President and General Manager of Refinery of the South Texas Cotton Oil Company.

There were few men in the United States who had attained higher distinction in the scientific side of the Cotton Oil Industry and he was regarded by many as having no superior in his knowledge of refining and compound manufacture. He was known to be the first man to make use of carbon black in the refinery.

Therefore, Be it resolved that our Secretary be instructed to extend our sympathy to his bereaved family and that a copy of this resolution be sent to his widow and sons.

P. S. TILSON.
L. F. HOYT.
E. R. BARROW.

REPORT OF SEED COMMITTEE FOR SEASON OF 1925-26

For the past decade, it has been the hope of everyone interested in the cottonseed products industry that an accurate and dependable method for seed analysis would ultimately be devised. It seemed hopeless, for years, that this would ever be accomplished, but the present Seed Committee believes that a method—easy of manipulation—which can be depended upon to give results comparable with mill yields has finally been worked out. Step by step, at the cost of much hard work by successive seed committees as well as by individual effort, this method has been evolved.

The chief trouble with seed analyses had always been the lint, as this prevented the grinding of a sample to sufficient fineness for analytical procedure. In addition to this, excessive moisture during the early part of the season was another problem, as wet seed simply mash and do not grind and therefore a representative sample for analysis could not be obtained on such seed. For many years the old method of cutting seed and analyzing the meats and hulls separately was the accepted procedure. The objection to this was the necessarily small sample—10 grams—which was of course not representative, as well as the time consumed in cutting. Also, oil was always lost in grinding the meats for analysis.

Various methods of analyzing whole seed have at times been proposed, to be tried out and discarded. First, there was the method of delinting seed with sulphuric acid and, after drying, grinding and analyzing the delinted seed. Unfortunately, the acid attacked the hulls as well as the lint so this method was quickly discarded as being impractical for handling seed in bulk. Later, placing 5 grams of seed in small canvas bags and extracting, after mashing the seed inside the bags with a hammer, was tried. Ammonia was determined on whole seed by this method. Concordant results were impossible, but this method was used for quite a while on the basis of making several extractions on each sample and averaging results. Numerous other methods have also been tried.

Of all the methods proposed during the past ten years, only one, the basic principle proposed by John Malowan, of hydrolyzing the lint of seed with hydrochloric acid, thus rendering it brittle and grindable and permitting large samples to be used, has survived the test of years of co-operative work. This method has been evolved from its crude beginnings to its present state of accuracy and ease of manipulation only as the result of patience and persistence in the face of discouragement and disappointment time after time. It is impossible for one who has not worked on seed analytical research for a number of years to fully understand the hope of achievement and subsequent disillusionment which followed in

rapid succession as the work was carried on. Each method, sooner or later, developed some weakness which necessitated discarding it.

From its beginning, the Malowan method gave closer checks and more concordance than any before proposed, but it was soon apparent that though ammonia results were accurate, oil results, for some reason not then understood, were usually too high. However, during the season of 1924-25 Messrs. Malowan and Picard, working together (there was no official Seed Committee that season), discovered that the use of liquid hydrochloric acid was the cause of the high oil results. The charring of the lint and hulls in part from the direct action of the acid while the seed were being dried, produced changes sufficient to raise the oil results. The remedy—to use gaseous acid—was obvious, though not quite so simple in its application as it might seem. The use of a false bottom to a beaker to elevate the seed above a small quantity of acid to be vaporized in the oven with simultaneous drying of the seed was not thoroughly satisfactory, as condensation of the acid in the lower part of the seed produced charring. However, when the discolored seed were discarded the results on the residual seed were excellent.

At this period of the committee work, the oil mill season of 1924-5 ended and Mr. Malowan accepted a position in a line of business not connected with cottonseed products, thus being compelled to leave unfinished on his part research on which he had spent much time and thought for a decade. For the season of 1925-26 the chairman was asked to choose his committee for seed work and selected the following men: C. H. Cox, of the Barrow-Agee Laboratories, Memphis, Tenn; G. R. Dunning, of the Fort Worth Laboratories, Fort Worth, Texas; W. D. Hutchins, of the Southern Cotton Oil Co., Savannah, Ga.; and C. M. Putland, of the Portsmouth Cotton Oil Refining Corp., Portsmouth, Va. This formed a well balanced committee composed of men from entirely different sections of the country and in addition, having two men from commercial laboratories and two from corporations, thus getting the benefit of the different view-point of each side.

By happy chance, unknown to the chairman at the time of the selection of the committee, Messrs. Cox and Dunning had been doing independent work on seed analysis and much of the Seed Committee's time was spent in studying modifications of the Malowan method proposed by these two gentlemen. The chairman of the committee had devised a special glass tube for treating seed, which gave excellent results, though rather unhandy to manipulate. These tubes were 60 mm. x 60 mm., drawn to a funnel shape at the bottom and terminating with a small well to hold 3 cc. of hydrochloric acid. The seed were supported on a porcelain filter plate. That this treatment was good is shown by the results on seed samples 1 to 4 which were run, in part, in these tubes.

However, it is not enough that any method for seed analysis be merely accurate. It must also be practicable for handling a large number of samples at one time with a minimum of effort. Nothing is to be gained by advocating any method, no matter how accurate, if it is not adapted to the working conditions of the average cottonseed products laboratory during the rush of the season when minutes are precious. Therefore, when Mr. Cox brought to the attention of the chairman of the committee a most ingenious modification of the Malowan method devised by him, the chairman, after trying it out, saw at once that after many years, a practical and accurate method of treating seed had at last been devised, adaptable in every way to work on a large scale. This method of treatment is simply to pour a few cc. of hydrochloric acid around the sides and bottom of a 3-inch flower pot and after it has been absorbed into the pores place 50 grams (or more) of seed in the pot and heat at 130° C. for an hour until the acid has been expelled. This treatment *absolutely* does away with any charring of the lint but leaves the lint more brittle than any other method and the seed can be ground to a meal of uniform composition. After the proposal of this method, the glass tubes were withdrawn from experimental use.

At about the same time, Mr. Dunning proposed a trial on the method used at the Fort Worth Laboratories, which consists of placing exactly 50 grams of seed on watch glasses in a suitable glass container and passing gaseous hydrochloric acid through the samples. After treatment, the samples are placed in an oven at 110-130° C. for ten minutes and then allowed to cool. When cold, all lint is rubbed off the seed by hand and the delinted seed are carefully weighed and ground. Results are figured on the difference in weight of the raw and the delinted seed. This procedure was submitted to the committee for study and trial.

Now, in comparing the two methods studied, it must be remembered that cottonseed is very variable in moisture and at times may be so wet as to be ungrindable. A method of analysis acceptable to the Society must be suitable for handling all degrees of moisture *alike*—that is, after the seed are prepared for analysis the analytical procedure should be the same in all cases. In the Cox procedure the seed may remain in the oven until sufficiently dry (about 6 per cent) to grind to a uniform meal, taking but a single extraction. The basis of calculation of this method is in the moisture in the whole seed and the moisture in the treated seed. As these determinations are run side by side, any actual errors in moisture determinations are relative and are about the same on both the whole seed and the treated seed, therefore the moisture element as a source of error in calculation can be practically eliminated. The Cox modification, therefore, is adaptable to seed in any range of moisture.

The Dunning modification, on account of the very short time the seed remain in the oven, does not seem as widely applicable to varying moisture conditions as the Cox modification. Though the Fort Worth Laboratories obtain good results with it on high moisture seed, it is obvious that double extractions would have to be used on wet seed as the short heating would not dry the seed sufficiently to grind to a uniform meal. One point brought up by Mr. Hutchins is that there is a possible source of error due to the change in moisture conditions during grinding of the delinted seed which he thinks is likely to be larger than can exist in the standard Malowan method—unless the seed are allowed to reach a moisture equilibrium before grinding. This seems logical because the Malowan method, as orginally proposed, was figured on the difference in the weight of the raw and treated seed and results did not check well among different operators until this was discarded and the calculation based on difference in moisture.

The committee finds that the Cox modification offers much more ease of manipulation than the Dunning procedure. There is less of the personal element. This might be overcome in the Dunning method by using mechanical shaking instead of rubbing by hand to remove the lint from the seed, but the change of the sample from one container to another in the preliminary treatment is unnecessarily time consuming. The Cox modification uses one container only and the sample goes from the oven treatment directly to the mill.

It is not a question of accuracy alone, as pointed out above, for the Seed Committee agrees that the Dunning modification, when carried out properly, is fully as accurate as any method proposed, but adaptability and ease of manipulation under average laboratory conditions must be considered as well in advising the adoption of any method by the Society.

The majority of the committee, composed of Messrs. Hutchins, Putland and Picard (Messrs. Cox and Dunning, as the proposers of the two methods under consideration, not voting), unanimously feel that the modification of the Malowan method as devised by C. H. Cox, should be be adopted as official and recommended for use for the season 1926-27. This method eliminates the large source of error in the original Malowan method—the charring of the seed in treating—and has also been tested against actual mill yields with thoroughly satisfactory results.

It is also recommended that the Dunning modification be studied by next year's committee with especial reference to mechanical delinting of seed and a report made as to its adaptability as an alternate method for official use. It would be well, also, to test it against mill yields, for this is the final proof of the value of any method.

Below are given tabulated reports, with explanatory notes, covering the actual work done by this year's committee.

Samples 1 to 4, whole unground seed, were run partly by the special tube method and partly by the flower pot and Fort Worth methods. The method used is given. It will be noted that agreement is close throughout. The seed for these four samples were carefully selected for uniformity.

RESULTS ON SAMPLE NO. 1

Analyst / Method	Cox Tube	Dunning Tube	Hutchins Tube	Putland Tube	Picard Tube	Average
Moisture	7.20	7.51	7.45	6.33	7.02	7.10
Oil	19.91	20.60	19.79	19.57	19.87	19.95
Ammonia	4.05	4.03	4.14	4.07	4.09	4.09

RESULTS ON SAMPLE NO. 2

Analyst / Method	Cox Flower Pot	Dunning Tube	Dunning Delinted	Hutchins Tube	Putland Tube	Picard Tube	Average
Moisture	11.48	10.17	10.17	10.72	11.11	11.70	10.89
Oil	17.50	18.16	17.50	18.16	18.13	17.81	17.88
Ammonia	4.03	4.28	4.04	3.99	3.98	4.09	4.07

RESULTS ON SAMPLE NO. 3

Analyst / Method	Cox Flower Pot	Dunning Tube	Dunning Delinted	Hutchins Tube	Putland Tube	Picard Tube	Average
Moisture	11.10	9.78	9.78	10.15	10.45	10.88	10.37
Oil	17.41	17.96	18.18	18.55	18.09	18.14	18.06
Ammonia	4.00	4.12	4.18	4.10	3.91	4.09	4.07

RESULTS ON SAMPLE NO. 4

Analyst / Method	Cox Flower Pot	Dunning Tube	Hutchins Tube	Putland Tube	Picard Tube	Average
Moisture	12.05	12.49	10.70	11.95	12.08	11.86
Oil	17.45	17.80	18.20	18.39	18.08	17.98
Ammonia	4.10	4.15	4.05	3.99	4.08	4.07

Seed samples 5 to 9 were treated with hydrochloric acid by the flower pot method and ground so that all meats passed a 30 mesh sieve. This fineness of grinding of the meats granulates the hulls so that on remixing, a meal of uniform texture is produced. In none of the samples was there any charring of lint by the acid. The lint was completely attacked by the acid and was thoroughly disintegrated by the mill so that no traces of lint were visible in the ground material. The double extraction consisted of two extractions of 2 hours each with a regrinding between. The single extraction was of 5 hours duration. It will be noticed that with the proper preparation of the sample, single extractions check double extractions closely. It must be strongly stressed, however, that unless samples are *uniformly ground* to a certain degree of fineness, double extractions are necessary.

RESULTS ON SAMPLE NO. 5

Analyst	Cox	Dunning	Hutchins	Putland	Picard	Av.
Oil: Double Ext.	19.38	19.37	19.30	19.63	19.24	
	19.45	19.25	19.28	19.70	19.28	
	19.43	19.31	19.29	19.67	19.26	19.39
Single Ext.	19.33	19.30	19.12	19.33	1929	
	19.23	18.96	19.32	19.14	19.09	
	19.28	19.13	19.22	19.23	19.19	19.21

RESULTS ON SAMPLE NO. 6

Analyst	Cox	Dunning	Hutchins	Putland	Picard	Av.
Oil: Double Ext.	21.08	20.80	21.18	21.00	21.09	
	21.05	20.78	21.20	20.94	21.05	
	21.07	20.79	21.19	20.97	21.07	21.02
Single Ext.	21.15	20.55	21.17	21.10	20.89	
	21.03	20.79	21.24	21.17	20.97	
	21.09	20.68	21.18	21.13	20.83	20.98

RESULTS ON SAMPLE NO. 7

Oil: Double Ext.	19.73	19.25	19.64	19.97	19.69	
	19.58	.....	19.70	19.90	19.67	
	19.65	19.25	19.67	19.94	19.68	19.64
Single Ext.	19.65	19.49	19.44	20.17	19.50	
	19.63	.....	19.40	19.83	19.38	
	19.64	19.49	19.42	20.00	19.44	19.59

RESULTS ON SAMPLE NO. 8

Moisture	5.12	5.06	5.08	5.16	5.19	5.12
Ammonia	4.30	4.34	4.24	4.20	4.29	4.27
Oil (Double Ext.)	19.54	20.22	19.97	.....	19.50	19.82
(Single Ext.)	19.64	19.80	19.74	19.66	19.50	19.67

RESULTS ON SAMPLES NO. 9

Moisture	5.50	.....	5.58	.....	5.66	5.58
Ammonia	.....	4.55	4.40	.....	4.50	4.48
Oil (Double Ext.)	18.07	17.88	18.17	.....	18.02	18.04
(Single Ext.)	18.05	17.73	18.20	.....	17.98	17.99

When these four samples were sent out the season was far advanced and practically no prime seed could be obtained. The samples were composed of off seed and in spite of all care in preparing, the resulting material was not uniform, yet results agreed fairly well—in fact, better than on prime seed by older methods.

RESULTS ON SAMPLE NO. 10

Analyst	Cox	Dunning	Hutchins	Putland	Picard	Av.
Flower Pot Method						
Moisture	7.10	.....	7.36	6.12	6.28	6.72
Ammonia	4.20	.....	4.12	4.25	4.16	4.18
Oil: (Double Ext.)	19.42	.....	18.96	19.46	19.44	19.32
(Single Ext.)	19.42	.....	18.77	19.33	19.44	19.24
Delinted Method						
Moisture	7.10	.....	7.36	.....	6.28	6.72
Ammonia	4.02	4.00	4.08	.....	4.04	4.04
Oil: (Double Ext.)	19.42	.....	18.53	.....	18.63	18.86
(Single Ext.)	19.35	17.17	18.58	.....	18.63	18.43

RESULTS ON SAMPLE NO. 11

Flower Pot Method						
Moisture	6.65	.....	6.04	7.04	6.99	6.68
Ammonia	4.41	.....	4.28	4.30	4.31	4.31
Oil: (Double Ext.)	20.26	.....	20.38	21.22	19.90	20.18
(Single Ext.)	20.25	.....	20.46	20.96	19.89	20.39
Delinted Method						
Moisture	6.65	.....	6.04	.....	6.99	6.68
Ammonia	4.12	4.18	3.92	.....	4.23	4.11
Oil: (Double Ext.)	.....	19.06	.....	.....	19.62	19.34
(Single Ext.)	19.72	.....	18.23	.....	.....	18.97

RESULTS ON SAMPLE NO. 12

Analyst	Cox	Dunning	Hutchins	Putland	Picard	Av.
Flower Pot Method						
Moisture	7.20	.....	6.29	.....	7.77	7.04
Ammonia	4.57	.....	4.32	.....	4.55	4.48
Oil	16.64	.....	18.06	17.76	16.80	17.32
Delinted Method						
Moisture	7.20	.....	6.29	.....	7.77	7.04
Ammonia	4.45	4.46	4.44	.....	4.58	4.48
Oil	18.02	17.44	17.88	.....	17.33	17.69

RESULTS ON SAMPLE NO. 13

Flower Pot Method						
Moisture	6.60	.....	6.04	.....	6.88	6.51
Ammonia	4.12	.....	4.28	.....	4.21	4.15
Oil	19.70	.....	20.17	19.92	19.80	19.87
Delinted Method						
Moisture	.....	.....	6.04	.....	6.88	6.46
Ammonia	.....	4.19	4.19	.....	4.21	4.20
Oil	.....	19.22	19.92	.....	19.17	19.45

Respectfully submitted,

Seed Committee, 1925-26.
D. C. PICARD, *Chairman*
C. H. COX
G. R. DUNNING
W. D. HUTCHINS
C. M. PUTLAND

SOME PERSONAL OBSERVATIONS OF THE OIL AND CAKE INDUSTRY IN GREAT BRITAIN

By H. J. MORRISON

The Great War made necessary many changes and readjustments in very many fields of production and manufacturing in European countries. In no country probably were changes from old customs to new greater than in Great Britain. Great Britain being a free trade country it was, of course, a natural sequence that they manufactured only those products which they can do cheaply enough to compete in the world markets, buying or trading in those products of other countries which were produced at a lower cost.

Before the war, Great Britain was not a great factor in the crushing or extraction of oils for the above reason. The shutting off of sources of supply, however, necessitated their entering the field. Thus, compound cake manufacturers, who before the war imported most of their cake and meal, took up the crushing and extraction to supply their needs.

Margarin manufacture had a large expansion and necessitated the procuring of supplies first hand. Great Britain's colonies and other countries who had previously sent large supplies of oil seeds to the Central Powers had large surpluses to divert. Thus, there were many factors which led to a great increase in oil production direct from the oil seeds. Our tariff served to keep these industries alive, as the world's crops of oil seed with American competition reduced to zero offered much cheap raw material and ready markets.

The British are distinctly a trading nation, and their hereditary instincts seem to prevent them from establishing strict grades and specifications. The trader wants the widest latitude. The romance of horse trading would be reduced to zero if each horse was graded by strict standards and arbitration boards set up to determine whether the horse was strictly prime or not. The British trader wants none of this.

At the one mill, the question was asked as to the content of water in a certain cake, and the naïve reply was that in winter it could carry 15 per cent; but in summer it would spoil at that figure, so between 10 and 11 per cent prevailed for the warmer weather.

Cake and meal are not sold on a protein basis, and for this reason most of the British output is sold as cake, as probably the buyer has more faith that he will get the genuine article in this form, whereas the meal might easily have something added. Besides, the leading crushers by years of strictly upright dealing have built up splendid and valuable good wills, and by selling in cake form whereon they impress their name and trademark they carry their guarantee to the ultimate consumer. Such would not be the case with meal.

Some oil seeds, of course, produce very uniform quality cake because they have no hull to speak of. Thus, soya and palm kernels only vary by the amount of oil and water left in them. On the other hand, cottonseed, linseed, peanuts, etc., vary in the degree to which they have been decorticated. The former are pressed largely without any decortication, and even the so-called decorticated still carries large quantities of hulls.

Peanuts are readily decorticated and cleaned, so the decorticated product should show practically no hull. The value of the guarantee that extra hulls do not find their way into the undecorticated depends at times upon the reliability of the impressed trademark on the cake.

It is also a custom to make compound cakes of two or more seeds. Thus, linseed-soya bean or cottonseed-soya bean cakes are marketed.

Oils, like cakes, are not graded as we grade cottonseed. They must, however, be true to name. No adulterations are tolerated. Some general specifications obtain, such as fairly broad limits on free fatty acid, etc; but otherwise they usually designate it as good average quality for season, etc.

In selecting methods under war conditions mistakes were possible, but on the whole, experience of the best methods of other countries were available. We find, then, both expression and extraction practiced, and often the two methods applied to the same seed in a single plant. Some seeds, however, are treated almost exclusively by the one or the other method. Thus, soya beans are practically all treated by the solvent method, whereas cottonseed is universally pressed. Palm kernels one finds being both pressed and extracted. The method to be used must be determined for each seed, as the effect on the quality of the oil and cake, whether expressed or exacted, is quite different in many instances, and the demand for the respective products differs widely.

The hydraulic presses used in England constitute every variety manufactured it would seem. There is no consensus of opinion which is the best and most economical. In fact, in the same mill one finds different varieties of presses. At least, the difference in cost of operation of one type over another is not sufficient to allow the scrapping of the less efficient machine.

The rolling is also done in various ways. However, with several varieties of seed handled in a single mill with the same equipment might account for this. The type or rolling for one seed might not be the best for another, but not sufficiently inefficient to warrant a separate installation.

There are as many methods of cooking as we have in this country and each advocate is as sure as many of our superintendents are that their method is the best. Cooking is done in continuous five high cookers of American design to cooking in open pans with live steam, where the meats do not get more than 10 minutes' cooking and not over 200° F. But,

strange to say, the results reported do not differ much from each other nor from the average figures in this country on mill run. The figures are not always directly comparable because of the difference in the amount of decortication, but on a ratio basis, i.e., oil divided by protein, the difference is not so decidedly in favor of any particular method. Possibly what one method gains in one direction, it loses in another.

The costs of crushing and pressing are higher in Great Britain than here. Our labor rate per hour is lower, but this does not account for the difference. Our output per man hour is greater. In addition, in the United States figures used in comparison, there was included delinting, decortication, etc., whereas the British figures cover only a very little of these operations.

In many quarters, especially in Great Britain, there is still a decided prejudice against extracted meal, and it sells at a discount as against the expressed cake. This discount is such that the differential in cost of preparation is just about wiped out. Thus, palm kernel cake always sells considerably above palm kernel meal. (The extracted seed, of course, are marketed as meal except where special proprietary compounds are made and molded into small lumps or nuggets.)

In some countries, however, as in the Scandinavian countries, extracted meal sells on a par or is preferred to expressed cake. In these countries, they recognize that for feeding purposes protein is more desirable than oil, and as the materials are sold "as is" and not on the protein content, they get slightly more protein in the practically oil-free meal. For this reason, soya beans are almost always extracted and the meal largely exported, and this sets the market value largely. Soya beans make a very concentrated food, whereas palm kernel meal or cake is low in food value and, consequently, will not bear the extra freight charges for export and hence must find a market near at hand and thus suffers because of the British farmer's prejudice.

Practically all extractors have tried from time to time to extract cottonseed, but not successfully. The oil is dark and hard or impossible to refine, and the meal almost unsalable. The cottonseed experimented on has been of both the general varieties, the bald Egyptian and the woolly variety such as we have, the latter coming from India and South America.

The extraction apparatus are for the most part fairly standard, differing only in small details. The various manufacturers, of course, make much of their special details, but as a matter of fact it is conceded by all users that the simpler the apparatus is the better. Simple percolators run in some mills in tandem and in others singly, simple still with efficient condenser, a liberal supply of cold water, and a dryer for the meal are the only essentially important parts. The art of successful extraction seems to lie more in the proper grinding or rolling of the oil seeds and is different

for each. Some seeds, such as peanut, do not extract well if completely decorticated, and a preliminary pressing to reduce the oil content is practiced. Palm kernels, however, the higher in oil, have such a fibrous meat that it extracts readily without any preliminary treatment.

On the whole, it would appear that extraction is not gaining ground, though both cake and oil can now be made quite free from the former objection of retaining traces of the solvent.

The solvent used almost exclusively is a narrow cut of gasoline. Other solvents have one objection or another. Most of them are excellent solvents for color and other matters. Others, especially the synthetic solvents, though having the valuable feature of being uninflammable and in many cases heavier than water are objectionable on account of their too great solvent power and their hydrolyzing to corrosive elements.

The expansion in cultivation and gathering of oil bearing seeds and nuts is progressing rapidly. Peanuts and palm kernels are especially increasing crops. Sunflower oil and seed from Russia are being produced in exportable quantities and can be greatly increased if the proper encouragement is given by the Soviet Government.

It seems to be the opinion that American cottonseed oil has lost its position formerly enjoyed, at least it will have to compete with many oils formerly considered inferior, but which now through necessity they have learned how to refine and utilize and a public educated to their uses.

IVORYDALE, OHIO,
May, 1926.

REPORT OF THE PLANNING COMMITTEE

The work of the planning committee during the past year has been an effort to correlate as much as possible the work of the various committees of the Society. Letters were sent out to the chairmen of the various committees last fall and several times since. It appears that on account of the great amount of business of the several laboratories that it has been very difficult to get results of the committee together in time so as to embody them in a complete report.

The Committee on Basic Research, Mr. Barrows, Chairman, made a very full report, covering practically the same ground as that published in the Cotton Oil Press last fall. Mr. Malowan has turned in a very satisfactory report on seed analysis. The reports of the other committees have been more or less held up and will be presented at the meeting by the several chairmen of committee.

The chairman of this committee feels that he has not been able to give to this work the care and attention which it deserves, and would like to suggest appointment of a new chairman. A man has already been picked out, who is particularly qualified not only by experience but on account of laboratory and research facilities, and it is trusted that our new president will prevail upon him to accept the chairmanship of this important committee for the coming year.

DAVID WESSON, *Chairman*
May 6, 1926.

SUGGESTED METHOD FOR EVALUATING COTTONSEED FOR CRUSHING PURPOSES

By G. S. MELOY

It was with mingled feelings that I accepted the invitation of your president to appear before you. Needless to say, I felt greatly honored, but at the same time, the subject I have makes me feel as a layman well might who had the temerity to appear before a medical clinic and expound a new theory for correcting a physical deformity.

I am not a chemist and so I come simply as one who has been looking over the figures and tabulating the quantitative analyses of cottonseed that you chemists have been making. In making up my tables and graphs, I have attempted to correlate the data you have supplied with some of the physical circumstances surrounding the purchasing, handling, conditioning and crushing of cottonseed.

Let us consider for a moment the relative value of the four products of the cottonseed crushing industry. First in value is the oil, which during the past five years has averaged 52.5 per cent of the total value of all the products. Second, meal with an average value of 34.5 per cent of all products. Third, hulls which have represented an average of 6.1 per cent. Lastly, linters which in the same period have represented an average value of 5.9 per cent. From this we see that the oil and meal have a combined average value of 87 per cent of the gross receipts of the oil mills—the range during the five year period being from 81 per cent to 93.3 per cent, while the hulls and linters had a combined average value of only 13 per cent. The hulls and linters are not only of small relative value, but can be set down as of fairly constant relative value; but the oil and the meal not only constitute nearly 90 per cent of the value, but they are variables in quantity, in quality and in units of value. So much so, that the value of the supplies of raw seed bear a direct relation to them.

If we leave out of our consideration for a moment the question of free acid and damage, and consider prime oil only, the question of quantity of oil is paramount and of almost equal weight is the amount, character, and local value of the meal. Two methods for estimating the quantity of oil have been used. The old method most generally used is to determine the percentage of oil in the meats and the percentage of meats in the ton and from these to calculate the oil yield. The newer method, which some of you chemists have been practicing during the past season or two, is to make a direct determination of the percentage of oil in the gross ton. This appears to me to be a step in the right direction; but it still leaves out many factors which should be considered in evaluating seed to be purchased. For instance, it leaves out that very serious factor, the effect of foreign

matter, both dirt and moisture, on the keeping and handling qualities of the seed.

Some ten or fifteen years ago the Department of Agriculture conducted a series of tests to determine whether the variations in the oil content of cottonseed was a varietal characteristic or due to some other cause. For this purpose a series of twenty or more varieties were planted in a number of places in each of the cotton growing states and the seed produced under all of the different conditions of rainfall, temperature and soil represented in the plantings, were assembled and carefully analyzed and the results of the analyses over a period of several years compared. At the same time records were kept of the growing conditions under which each set of seed were matured. After the tests were completed almost all that could be said, safely, was that the percentage of oil in the meats seemed to be correlated with growing conditions; soil, rainfall and temperature, and not to the variety of cotton. But it was always found that the amount of oil in any quantity of seed depended greatly upon the proportion of matter other than kernel contained in those seed. So that while considerable variations in the oil-in-meats character are found because of the very nature of the causal factors referred to, nevertheless, within sections where similar growing conditions obtain, we can generally assume that the oil in the meats is fairly constant regardless of the variety of seed. However, in the plan for evaluating cottonseed for crushing purposes which I am about to suggest, it is not proposed to act wholly on this assumption, but through frequent and regular analyses to check the percentage of oil, and on large shipments to make specific determinations. In fact, specific determinations, in my opinion, should be the rule rather than the exception. In the analyses that I have reviewed during the past year the percentage of oil in the meats varied from 33 to 39. But, rarely did I find the percentage in any single district varying more than one per cent as a 33-34 or a 35-36, and then only where there was a marked difference in the soil in the section, as hill lands and river bottoms.

So much for the oil-in-meats factor. Next we come to the percentage of meats per ton of seed. The situation here is more complicated. Percentage of meats might be said to be the residuum after deducting foreign matter such as sand and dirt, sticks and boll shucks, thick and heavy or thin and light hulls, aborted and immature seeds which increase the hull content without contributing to the meats, and, finally, moisture.

Let us consider first the question of dirt. In the past it has been the custom to pay the freight on the gross tonnage, then to clean the seed and to pay for a net tonnage. But what of the effect of the dirt? The seeds themselves have been contaminated. They have been impregnated with fungus spores, which are only awaiting proper germination conditions to start fermentation and rot. Not only does dirt act as a carrier of rot

causing fungi, but when allowed to remain in the seed provides one, and sometimes two conditions which hasten the growth of those fungi. Dirt in seed always prevents ventilation. It fills up the interstices between the seeds so that no air can circulate through them to cool and dry them out. In addition the dirt which is found in cottonseed is nearly always moist and this moisture added to that already in the seed and combined with a stoppage of ventilation has but one inevitable result—rot. Therefore, dirty seeds have not the same value after cleaning as seed that have been kept clean.

The next item is the extent and thickness of the seed hulls. This item is influenced very materially by the size of the seed. Suppose, for example, that cottonseed were cubes ¼ inch square. A cubic foot of such seed would contain something like 41,422 square inches of hull; but if they were cubes ⅛ inch square they would have just twice as much or 82,844 square inches of hull and this increase in hull would be accompanied by a marked decrease in the amount of kernel contained within those hulls. We have assumed cubes for convenience, but the variations in the diameters of cottonseeds are not far from these proportions. A very interesting phase of the question of small and large seed is to be seen from the breeder's viewpoint. Small seed are correlated with poor degenerate varieties of cotton and conversely nearly all of the varieties that have been bred along scientific lines have large seed. In my own studies of cottonseed I have found varieties in which the seed weighed only 6 grams to the hundred and other varieties the seed of which weighed over 20 grams to the hundred; but 20 grams to the hundred is the exception. Modern, well-bred varieties have seed ranging from 12 to 15 grams per 100 seed, or from 3,020 to 3,775 seeds to the pound. Small, seeded, degenerate varieties run nearer to 7,550 to the pound.

Another item that influences the percentage of kernel per ton is aborted and immature seed. Such seed are seldom composed of anything other than the testa. Rarely do we find more than the rudiments of either the germ or the cotyledons. An effort has been made in the past to penalize immature seed along with damaged seed, but since their true basis is merely a decrease in the percentage of kernel per ton, the attempt to place them in the same category with damaged seed has never been justified. I know that it has been alleged that immature seed increases the fiber content of meal, but that is no justification for classing them with damaged seed. Moreover, I have yet to be shown that immature or aborted seed play any part in the fiber content of meal. My experience has been that they are the first to felt and separate out during sifting.

At present we have no basis for computing proper reductions on account of excess moisture. Excess moisture is foreign matter as far as percentage of kernels is concerned. In addition it furnishes one of the

PROPOSED GRADES AND TABLES FOR EVALUATING COTTON SEED FOR CRUSHING PURPOSES.

TABLES FOR EVALUATION (pounds of oil)

Names and kernel content in percentages per ton		Oil-in-Meats-Factor 33%	34%	35%	36%	37%	38%	39%
Grade No. 1	60	396.0	408.0	420.0	432.0	444.0	456.0	468.0
or	59	389.4	401.2	413.0	424.8	436.6	448.4	460.2
"Fancy"	58	382.8	394.4	406.0	417.6	429.2	440.8	452.4
Grade No. 2	57	376.2	387.6	399.0	410.4	421.8	433.2	444.6
or	56	369.6	380.8	392.0	403.2	414.4	425.6	436.8
"Extra"	55	363.0	374.0	385.0	396.0	407.0	418.0	429.0
Grade No. 3	54	356.4	367.2	378.0	388.8	399.6	410.4	421.2
or	53	349.8	360.4	371.0	381.6	392.2	402.8	413.4
"Good"	52	343.2	353.6	364.0	374.4	384.8	395.2	405.6
Grade No. 4	51	336.6	346.8	357.0	367.2	377.4	387.6	397.8
or Basis								
"Middling"		330.0	340.0	350.0	360.0	370.0	380.0	390.0
Grade No. 5	49	323.4	333.2	343.0	352.8	362.6	372.4	382.2
or	48	316.8	326.4	336.0	345.6	355.2	364.8	374.4
"Fair"	47	310.2	319.6	329.0	338.4	347.8	357.2	366.6
Grade No. 6	46	303.6	312.8	322.0	331.2	340.4	349.6	358.8
or	45	297.0	306.0	315.0	324.0	333.0	342.0	351.0
"Ordinary"	44	290.4	299.2	308.0	316.8	325.6	334.4	343.2
Grade No. 7	43	283.8	292.4	301.0	309.6	318.2	326.8	335.4
or	42	277.2	285.6	294.0	302.4	310.8	319.2	327.6
"Poor"	41	270.6	278.8	287.0	295.2	303.4	311.6	319.8

two chief physical conditions conducive to fermentation and rotting, the other condition being atmospheric heat. Excessive moisture may stimulate fermentation, but it is not a necessary factor. It is a demonstrated fact that seed well within the accepted safe moisture content, will rot when confined and subjected to high atmospheric temperature, if fungus spores are present. This is not only true of cottonseed, but is also true with other seed such as wheat, corn, grass, etc.

It is to meet these conditions that it is now suggested that purchases of cottonseed be made not upon the net weight of cleaned seed, but upon the gross weight of the seed after grading them on the basis of the amount of dirt and excess hull and moisture they contain.

In the first column in the chart the proposed grades are given. In the other columns are tables from which the value of any ton of seed may be computed on the current price of oil and the local market for meal, when the oil-in-meats factor of the place of origin of the seed are known. Under this system differentials are shown to be warranted and justifiable in the basis price in each section in which seed originate, on account of the oil-in-meats factor. Other and greater differentials for each grade above and below Grade No. 4 or middling seed are not only justified, but are essential if purchases of cottonseed are to be made on a sound basis. For the purpose of illustration: If the current quotation for oil is 10 cents, a differential of $1.00 per ton within Grade No. 4 is apparent on the basis of the oil-in-meats factor as shown in the columns under the various percentages of oil in the meats. And a differential of $2.00 for each grade, above and below the basis Grade No. 4.. Thus penalties for excess dirt, hulls and moisture are provided and at the same time similar premiums are offered for clean, large, well developed seed and freedom from excessive dirt and moisture.

To my mind, the first and most important question to decide is upon some plan for grading or evaluating seed. I have suggested a plan. The second question is how to put the scheme into practice. The first consideration is, of course, the character of the sample. How large a sample would be truly representative of a car? Certainly, we should have not less than 100 pounds to begin with. A 100 pound sample has two distinct advantages. Such a sample is large enough to be truly representative of a car. Each unit of a 100 pound lot is equivalent to one per cent of the sample. In this way calculations which are always avenues of error are avoided. Having secured the proper sample, let us proceed to determine the grade of the car. First, the sample should be thoroughly cleaned and then reweighed and the net weight noted. With clean seed the size of our sample may safely be reduced through quartering. Again, for the convenience of calculating, the sample should be reduced to 100 grams, less the original loss, or simply stated to the same number of grams as is the

net weight in pounds of the original sample. Remove the meats from this sample and weigh them and note their weight. Next determine the moisture content of the meats and correct the weight by the departure from a normal moisture tolerance of 10 per cent. The corrected weight in grams will then be the percentage of meats per gross ton of seed.

For example, if we start with a 100 pound sample and the cleaned seed weighs 88 pounds, reduce the cleaned seed to a sample of 100 grams minus 12 or to 88 grams and from this extract the kernels. If the extracted meats are found to weigh 55 grams and if the meats are of normal moisture, that is to say 10 per cent, the percentage of meats would be 55 and the grade a number two; but if on the other hand, the meats are found to contain 16 per cent of moisture, an excess of 6 per cent above normal, then 3.3 grams of water are to be subtracted and the corrected weight of the meats would be 51.7 grams. The percentage of kernels then would be 51.7 or a very good type of a grade number 4.

One hundred fair seed may next be cut and the damaged seed content determined in the usual manner and proper premiums or penalties computed on the departure from a standard of damaged tolerance.

W. E. Anderson, Fellow of the Institute of American Meat Packers, is studying the influence of diet upon the quality of fat produced in the animal body. The work is being done in the Laboratory of Physiological Chemistry, Yale University.

THE ANNUAL BANQUET

The banquet of the American Oil Chemists' Society was held on the evening of May 11 at the Chess, Checker and Whist Club. Seventy-five ladies and gentlemen sat down after the toastmaster, Dr. David Wesson, said Bobbie Burns grace. He appeared at the head table armed with a "Battle" gavel. Malicious rumor had it that a hoax of some kind would be perpetrated on the chemists during the course of the meal, and some were unkind enough to suggest that the celebrated gavel had been brought along for the speaker's protection.

The guests of honor were President Perry of the Interstate Cottonseed Crushers' Association, and Mrs. Perry; General Counsel Christie Benet and Mrs. Benet; Mr. and Mrs. Geldert; Mr. and Mrs. Meloy; and Mr. Ogden.

The press was represented by scribes from the *Times-Picayune* and the *Tribune*. They somehow learned that there might be a good news story, and the extracts from the papers seemed to indicate that they were not disappointed.

The toastmaster led a double life by introducing Dr. Wesson in his individual capacity in order for him to explain the synthetic steaks the newspapers have been telling about. He told how like a modest violet or blushing rose he had in simple scientific language announced at one time that a meat substitute could be prepared from cottonseed. The reporters had done the rest. He read a newspaper article wherein much fun was poked at synthetic beefsteak as well as himself, and then announced that the "Croquettes a la Creole" on the menu had been the real thing made from cottonseed meat.

Mrs. Geldert responded to the toast, "The Ladies," by telling about the men. Mr. Benet paid a fine tribute to chemistry and what it was doing and Mr. Perry told a wonderful story about the "Psaltre" and kept the crowd in roars of laughter.

Mr. Vollertsen in his valedictory address explained all about a new position and title conferred upon him by his friends Irwin of Swift & Co., and McLane of the Chickasha, who presented him with a carefully hand-drawn and illustrated certificate.

The trophy cup of the Smalley Foundation was presented to Dr. H. B. Battle after an appropriate speech by Archibald B. Campbell, who paid a touching tribute to Dr. Frank N. Smalley. Dr. Battle in receiving the cup stated it was the work of his associates that had won it and he could not take the credit to himself. He accepted it for the Battle Laboratory.

A tribute was paid to the memory of Dr. Frank N. Smalley and David Schwartz by the dinner guests, who stood for a moment in silence.

The meeting adjourned at the conclusion of an appropriate bedtime story by the toastmaster.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of Journal of Oil and Fat Industries, published monthly at New York, N. Y., for April 1, 1926

State of New York } ss.:
County of New York }

Before me, a Notary in and for the State and county aforesaid, personally appeared John T. Ogden, who, having been duly sworn according to law, deposes and says that he is the Editor of the Journal of Oil and Fat Industries, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper. the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Russell Palmer, 71 Columbia St., Seattle, Wash.; Editor, John T. Ogden, 27 Pearl St., New York City; Managing Editor, none; Business Manager, Russell Palmer, 71 Columbia St., Seattle, Wash.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. It not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Russell Palmer, 71 Columbia St., Seattle, Wash.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

JOHN T. OGDEN,

Sworn to and subscribed before me this 29th day of March, 1926.

(Seal.) Ruth C. Lane,

Notary Public, New York County.
My commission expires March 30, 1928.